File: Construction - Fire Protection

Fire-safety systems ordered in U.S. buildings

All new high-rise federal buildings will now be designed and constructed with life-safety oriented environmental control systems, automatic sprinkler systems and a central control center that will take over operation of the environmental system when fire or other emergency strikes.

The first structure to be so equipped will be the 36-story federal office building in Seattle, a $43.5-million project already under way.

Robert L. Kunzig, General Services Administration (GSA) administrator, announced the new federal building requirements this week in Washington, D.C., at a meeting on development of fire safety systems and criteria for high-rise federal buildings.

The new provisions are a direct result of a week-long conference on fire safety last April in Warrenton, Va. Design of the Seattle building was revised to implement the GSA order.

Commissioner Arthur F. Sampson, of the Public Buildings Service (PBS), GSA's building construction arm, said the systems will be installed in the Seattle building at no cost over that estimated before the new requirements were under consideration.

Sampson said various trade-offs from standard design and some building materials requirements offset those costs resulting from the total life-safety package ordered for the structure. Substructure work has been started by Hoffman Construction, Portland, Ore. Bids for the superstructure will be called next month, with a work-start expected by April, 1972. Architects are John Graham & Co., and Fred Bassetti & Co., both Seattle.

The life-safety systems in the Seattle building will include:

- Automatic sprinkler systems throughout.
- Dynamic smoke-control system.
- Elevator control systems that will automatically deliver cars to an exit floor in case of fire in the building.
- Internal and external two-way communication systems.
- Precoded and selective communication systems that will deliver the correct message appropriate to the emergency condition to the appropriate floor, floors or zones within the building.
- Immediate availability to responsible building personnel and fire department officers of graphic displays showing all sections of the building and location of standpipes and air handling systems.

The heart of the total life-safety package will be a master equipment control and communications center in the structure that will be manned continuously.

A fire alarm transmitted manually from a fire box station in the building, by water-flow in the sprinkler system, by a smoke sensing unit or by voice to the control center, will bring immediate reaction automatically. Auxiliary water pumps will go into operation, a two-way voice communication circuit will open immediately and the Seattle fire department will be called. The elevator car or cars operating in the fire-zone indicated by the alarm will go into emergency operation mode automatically. To prevent panic, a recording will automatically announce to car occupants reason for the change in direction and that the car is returning to an exit floor. Appropriate instructions by voice over the building's internal communication system will tell those in the fire zone and those outside the fire zone what to do.

The building will be divided into six vertical air zones, key to the dynamic smoke-control system. In case of fire, fans will automatically stop supplying air to the fire zone, but will continue to exhaust air. In the zones above and below the fire zone, fans will continue to supply air, but stop exhausting. This positive pressure will keep smoke from moving into nonfire zones. Fans in the elevator shafts will start operating and create positive pressure.

Testing unit can apply a 12-million-lb squeeze

The U.S. is now operating what is believed to be the world's largest testing machine, one capable of applying forces of 12 million lb in compression and 6 million lb in tension.

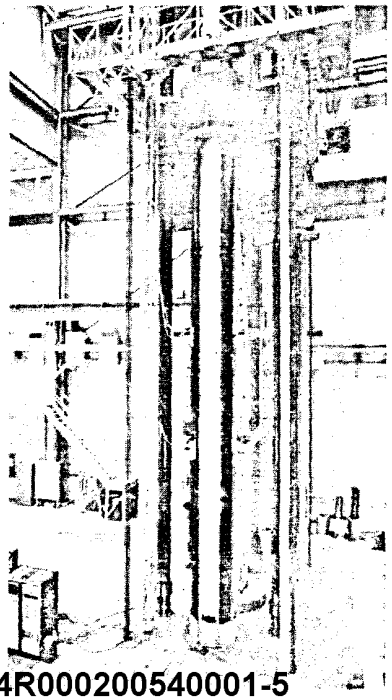
Total height of the machine, which is housed in a special building at the National Bureau of Standards (NBS), Gaithersburg, Md., is 101 ft high overall, 23 ft of which is below ground. Built at a cost of just under $2.2 million, the machine was designed primarily for testing full-scale structural components of the type used in high-rise buildings and in bridges.

The machine provides 60 ft of vertical space for compression tests. Specimens up to 55 ft long can be subjected to tension tests. In addition, 90-ft-long structural beams may be supported horizontally for flexure tests.

The first test, which took about three hours, was run on a 23 H 681 welded-plate steel column, 36 ft long. Total force on the A36 steel column was 6.1 million lb at a rate of 100,000 lb force per minute. This was a joint effort of the Column Research Council, Lehigh University's Fritz Engineering Laboratory and the NBS.

The machine's force is generated hydraulically by a ram 6.6 ft in diameter with a 5-ft power stroke. An independent hydraulic capsule acts as the load-sule excites pressure transducers that generate electrical signals proportional to the applied load. The applied force is indicated on a control console by two independent systems, one analog, the other digital.

E. W. Bliss Co., Salem, Ohio, manufactured the unit. Major assembly was done by McDowell-Wellman Co., Cleveland.



Steel column in place in testing unit.